

## Chapter 4

# Basic handling skills: spring and summer management including swarm control

### 4.1 Beekeeping — basic handling skills

#### 4.1.1 Introduction

The foundation of the enjoyable working of bees is to work in co-operation with the bees as far as possible. Beginners are always tempted to open the hive to look in to see how the bees are doing. It is necessary to do this periodically, and it should then be done quietly, quickly and efficiently, but unnecessary disturbance is as foolish as digging up one's potatoes to see how they are growing.

In approaching a beehive, as far as possible keep out of the line of flight of the bees to and from the entrance, and stand behind the hive, or to one side. If there are trees or bushes nearby which force the bees to fly high when approaching the hive, it can help the beekeeper in this respect. Any stamping on the ground or vibration — e.g., from a lawnmower — will be felt by the bees and may trigger their alarm reaction, so avoid it if you wish to inspect the hives, and if you are prudent you will wear your veil if your work near the hives necessitates such disturbance. The scent of cut and bruised vegetation is also alarming to the bees, so lawnmowing is doubly disturbing.

Bees keep the interior of their hive very warm, and they do not enjoy having the roof removed on a cold, wet, windy or thundery day any more than you would. They show their annoyance in the only way they can. So except in dire necessity, wait for warm quiet weather before opening a hive. If you must do so on a bad day, plan carefully what must be done, and work fast.

#### 4.1.2 Opening a hive and inspecting the combs

This is the basic skill that must be acquired, so I shall describe it in detail. I shall assume that a National hive is in use. Common sense should tell you how the routine must be varied for a different hive design.

Make sure you have at hand all the equipment you will need. Here is a basic list, but extras will be needed for special jobs:— **protective clothing, smoker, matches or lighter, smoker fuel, hive tool, rubbish container for scrapings of honey, wax and propolis (which should not be left lying around the apiary where they will encourage robbing and may spread disease).**

**BEFORE YOU START, HAVE CLEARLY IN MIND — EVEN WRITE DOWN IF YOU ARE INEXPERIENCED — WHAT IT IS YOU ARE PLANNING TO FIND AND DO.**

- Before approaching the hive, light the smoker, and put on protective clothing. Don't put on your veil before lighting the smoker or you may burn a hole in the veil if a stray spark gets on it. Among the best fuel is a rolled up cartridge of hessian sacking. Another good fuel is well dried rotten wood from dead trees. A roll of corrugated cardboard is also a possibility though it burns rather quickly. I have often used a supply of dried grass (available free from any piece of rough ground), started off with half a sheet of newspaper. It too burns rather too quickly. Make sure you have plenty of spare fuel in reserve and that the base of the fuel is well alight, and use the bellows until you are sure the smoker is producing plenty of cool whitish smoke. When the smoker starts to produce darker bluish smoke, it is a sign that the fuel is burning through. Re-fuel it before it turns into a flame-thrower!
- Before opening the hive, give one or two good puffs of smoke into the hive entrance, and leave the bees for about a minute for the smoke to take effect. No-one knows exactly why smoke pacifies bees, but its effect is that when there is unsealed nectar in the hive, the smoked bees rush to gorge themselves and thereafter become much more placid. Smoke can also be used to drive bees from a particular area so that bees are not inadvertently crushed. Crushing bees, as well as being bad management, causes large quantities of alarm pheromone to be released and quickly puts the hive out of temper. If you have the misfortune to be stung at any time, then freeze for a moment and take stock. Scrape out the sting and then smoke the place vigorously to kill the sting scent and inhibit further attack. This routine should be followed even if the sting is received on a glove or other piece of clothing and causes you personally no inconvenience at all.
- After a quick reminder puff of smoke at the entrance, remove the roof, being careful to avoid bumping and vibration as far as possible. The roof can be laid down upside down on a level place somewhere conveniently within reach but out of the way. Honey supers above the queen excluder are not usually examined. They should be removed bodily and stacked inside the upturned roof. If there are several, take the crown board off the top one as you place it in the roof, shake the bees on it down into the next super down by *bumping* the edge of it on your hand and put it on top of the next super before you lift that on to the top of the stack of supers, and when the last super is on the stack, bump the bees off the crown board over the top of the brood chamber of the hive, and then cover the stack of supers with it. When the supers are restored at the end, make sure they go back the correct way round and in the correct order on to the hive.

Removing a super that has been on the hive for some time is more than just a matter of lifting it off. First the seal of propolis at the junction of the boxes has to be broken by levering the boxes apart with the hive tool. As you part the boxes at one corner, puff smoke into the gap to keep bees away from the working area, so they won't be crushed as you withdraw the hive tool to move to the next corner. After all four corners have been freed, you may still find the tops of some of the frames in the lower box adhering to those in the upper box. If so *twist* the boxes apart and they should come free. This adhesion is usually worse in bottom bee-space hives (Nationals), which is why some prefer top bee-space (Smiths). There is quite a knack in doing all this with the minimum of bumping and vibration, particularly if the super is full of honey and therefore heavy. Whenever bees are exposed during this process, give them two good puffs of the smoker. If boxes have been undisturbed for many weeks or months, the frames in the upper box are sometimes so firmly fixed to those in the lower box that the upper box is physically impossible to separate as a unit. In that case the only remedy is to obtain an empty box, and to lift out the frames from the upper box one by one, placing them in the empty box in order with the bees adhering. These are desperate measures, not needed if your hives are regularly inspected, *provided the boxes have a proper bee space between them*. It is prudent to remove the propolis and brace comb from the bottom of each frame as you take it out, depositing the scrapings in the rubbish container, so that when the boxes are put back together again, there is restored a proper bee space for the bees to respect. Once the upper box is lifted clear, you can also scrape the propolis and brace comb from the top bars of the frames in the box below, again disposing of it tidily.

- Remove the queen excluder if there is one and examine it carefully to be sure the queen is not on it. Bump bees on it into the brood box, then lean it up in front of the hive. Returning foragers will be confused by it and not bother you.
- If the queen is found at ANY time, her safe disposal must be your first thought. She should be safely escorted, by hand if necessary, on to the centre of a brood comb and replaced in the hive. Until you have found her and know where she is, assume she is on every frame you handle, and treat it with appropriate care. If you injure the queen, you have destroyed the value of your stock.

A laying queen will hardly ever take wing except with a swarm. If you do ever have a queen fly off, then leave the frame tops exposed and wait ten minutes with no smoking. She will almost certainly return to the scent of the hive.

- Sometimes a hive has two boxes for the queen to lay in. In general if two boxes are to be inspected, it is best to lift off the upper one, and to start by inspecting the lower one, as then bees are not driven down as the upper combs are inspected, making a very crowded lower box when you come to it. However if the two are badly stuck together with propolis, you will have to start with the upper one (see above).

If the upper box is lifted off first, stack it separately from the supers to avoid the risk of letting the queen get into the honey supers, preferably in another hive roof, and cover it with something else. Never leave unattended frames exposed. The bees become agitated, and in cool weather the brood may become chilled. It also tempts bees from other hives to start robbing the honey which soon leads to PANDEMONIUM.

- Smoke the tops of the frames in the box to be inspected, but do not puff too much smoke down between the frames — just enough to keep the bees down — and scrape off any brace comb built on the tops of the frames with the hive tool. There may be some drone brood among it if your inter-box space is a little too wide, but its loss is of no great importance, but dispose of this in the rubbish container.

If using a cover cloth, spread it over all the frame tops and roll it back from one side to expose the first two frames.

- While actually inspecting, use as little smoke as necessary to keep the bees subdued. With the bent end of a standard hive tool, free the end frame by a horizontal twisting movement, or using the frame-lifter if you have it, lever one end up. If there is a dummy, then instead free that. Then lift it slowly and carefully out to avoid crushing bees. Inspect it carefully to be sure the queen is not on it — she will usually be found on a central frame where egg-laying is actively going on, but you never know. Provided she is NOT there, then this frame (or preferably the dummy) should be propped beside the hive. If it is a frame and contains brood, remember it must not be left out long enough to become chilled.

Now free and lift the second frame, inspect it and return it to the place of the first frame or the dummy, without turning it round. In inspecting a frame, try not to hold it out horizontally, but turn it so that it is at all times supported by its wooden frame. This is especially important with new “green” combs full of honey which can sometimes drop out of the frame under their own weight. Also as far as possible hold frames over the hive in case the queen should drop off and be lost in the grass.

- if using cover cloths bring the rolled-up second cover-cloth into use, by starting to unroll it over the frame you have replaced. Now work steadily across the box, lifting and inspecting each comb in turn and replacing it next to those you have already examined. As you work, move the slot between the cover-cloths with you by unrolling one and rolling up the other. Use only what smoke is necessary to keep the bees quiet. If you see a mass of them starting to pour out of the hive entrance and crowd up the face of the hive, you know you are over-smoking them.

- The *last* comb can be replaced in its own place. Then expose the side of the box where you began by rolling up the second cover-cloth, smoke there, and, using the hive tool as a lever, move the whole block of combs away from you back to its proper place. As the gap at the far end closes, smoke it to drive bees away before they are crushed. If the combs jam, they must be replaced one at a time. This is more disruptive to the hive so should be avoided if possible. There will now be space to replace the first frame or the dummy in its proper place, again using smoke in the gap so that bees are not crushed. Note that if a dummy is in use, this last stage can be avoided, by simply placing the dummy at the other side of the box. No *combs* are moved by this operation and next time you simply start at the other side. Finally use the hive tool at each end of the block of combs to lever them close together into a solid block and to ensure that there is a bee space at each end of the block.
- If there is another brood box, it may now be replaced and examined in its turn — or the top one removed, stacked and covered if the inspection is top down. However if a primary objective of the inspection is to find the queen, then the top box, if stacked initially, should be examined *where it is* if the queen was not found in the bottom box, or the queen may run down from the top box into the bottom box before she is found.
- After all the brood boxes have been inspected and replaced, bump any adhering bees off the queen excluder over the frame tops of the brood box by knocking the edge of it against the palm of your hand. Place the excluder on a flat surface such as a hive roof which is NOT on top of an occupied hive, and clean any brace comb off the excluder with the hive tool, being careful not to bend the wires or open up the slots, or it will no longer exclude the queen. Tidy up the mess.

Then give a puff or two of smoke over the frame tops to clear them of bees, replace the excluder, and on it stack the honey supers in the order they were in before they came off. Lastly bump any bees off the crown board into the top super and replace it, using a little smoke if necessary to avoid crushing bees.

I have described this in great detail. Your own working practice will almost certainly vary from this a little, but it is important to develop a well-organised systematic routine that becomes second nature, so that you can concentrate on the *objects* of your inspection. As a beginner you will want to practise this for its own sake, but remember that it is disruptive to the colony, and you should in general not look into a hive more than once a week unless it is really necessary.

## 4.2 Spring and summer management

Spring is supposed to start in March in Scotland, but for the beekeeper spring only starts when the weather warms up. The bees must not be neglected before then, but their management must continue to follow the winter regime that I shall not present here.

The true spring inspection should take place on the first day you are free when the sun shines and you are comfortable without a jersey — temperature over 16° C (60° F) — and when there is not too much wind. There will be no honey supers on yet.

Have a clean spare floor with you. Lift off the roof after smoking at the entrance as usual. As you lift off the roof, look inside it to see if it has been leaking rainwater in. If so, then its repair is urgent, and as soon as possible a dry replacement roof must be provided for the hive. Then put the roof upside down to receive the brood box or boxes.

Quickly stack ALL the brood boxes of the hive inside or diagonally on the roof. Carefully remove the hive floor from the stand, but do not shake off the adhering bees or the debris. Clean away quickly any rubbish from below where the floor was. Take care to remove as many chalk-brood mummies as you can, as they spread spores of the infection. Then place the clean floor on the stand,

and by wedging it up if necessary, make sure it does not rock, and that it is level from side to side and slopes slightly from back to front, so that any rain that blows into the entrance will drain out. If you are using open mesh floors, this slope is less important as water will drain through the mesh. Replace the bottom brood box on the clean floor, and if there is more than one, cover the other(s) with the crown board. Now begin an orthodox inspection of the brood boxes as described above. You have four questions to settle, all related to one another:

1. Is the colony queen-right?
2. Is the colony healthy?
3. How far developed is the colony?
4. Is there sufficient food for the colony?

1. To answer this question, you do NOT have to find the queen, though it is always reassuring if you do. The real proof of this however is the presence of developing brood in all stages including SEALED BROOD WITH WORKER CAPPINGS, and a HEALTHY PATTERN OF EGG-LAYING, with brood spreading out in concentric ovals from the central area where egg-laying started, so that the open brood is on the outside with eggs beyond that — unless the “first round” is already emerging as young workers, and the queen is starting again from the middle.
2. Pests and diseases of bees are a large topic dealt with at length in Chapter 6. Here is only a brief description of what is to be expected in a healthy colony; of some common but not too serious problems that are often found; and a brief indication of how to look out for the few really serious problems that need to be watched for.

Healthy **brood** will appear in the spring as concentric ovals of brood in all stages of development as described above. Look for *eggs* in particular to be sure a laying queen is present. The *open brood* should consist of pearly white larvae lying curled up in the bases of the cells with a small amount of whitish liquid bee milk. The *sealed brood* should be in even slabs of pale brown roughish cappings all of uniform appearance. At the end of its development phase there will be gaps in the pattern where bees have emerged, and you will probably see young adult bees emerging as you look at the comb, looking rather under-sized and covered with greyish downy hair. If the pattern contains too many gaps early on, it may be a sign of a failing queen.

The most common but not too serious problem with the brood is *chalk brood* where isolated uncapped cells among the sealed brood contain chalk-like mummified dead larvae. Try to avoid damp, and scrap old combs to reduce the level of this fungus infection.

After winter there will inevitably be some dead bees on the floor and outside the hive, but the living **adult bees** should all be active and healthy looking. Watch out for brown fouling of the combs and frames indicating *dysentery* which may have several different causes.

Now that *Varroa* has spread widely in Scotland, monitoring and dealing with this infestation has become a permanent necessity in this area and elsewhere. The details of how to do so are in Chapter 6.

If *wax moths* get into a hive (looking something like clothes moths) their larvae can quickly wreck large areas of comb which they reduce to a crumbly brown frass. They are usually more of a problem in combs (particularly brood combs) stored away from hives. Stored combs which become infested should be burned, and any wax moth pupae adhering to and concealed in crevices of woodwork destroyed. Wax moth infestation in a working colony is usually a sign of a weak colony. Get rid of the worst of the infestation, and try to clean things up as best you can.

If *mice* get into a hive, it is obvious, as they wreck the combs, eat the honey and kill the bees. Fit mouse-guards in autumn to avoid the problem in future. If any bees are still alive, they need to be fed, and urgently given clean combs (not foundation) to try to rescue them. This is not easy to achieve and usually mouse-infested stocks die.

*Slugs* often take up residence in damp hives with weak stocks. Kill them, don't just throw them out, or they will return. Try to keep hives dry and strong. The use of a beer-baited slug trap can reduce the slug population in a damp area.

Since 2009 outbreaks of the two serious conditions American Foul Brood (AFB) and European foul Brood (EFB) have occurred every year in Scotland, changing radically what we need to watch for. AFB shows as dark sunken cappings among the sealed brood covering rotting smelly remains of dead larvae that can be drawn out into a slimy "rope" with a matchstick. EFB usually shows as contorted "melted down" dead larvae among the open brood.

These two and two other infestations which have thankfully not yet appeared in this country are legally notifiable diseases. If you find or suspect you have any of them, you are legally obliged to notify your local office of the Scottish Government Rural Payments and Inspections Directorate (SGRPID). The contact details are given in Chapter 6.

If you find suspect brood comb or unhealthy looking bees, then send a 5 cm square of comb, or a sample of 20 to 30 adult bees (killed by an hour in the deep freeze) or as much floor debris as you can collect in a *cardboard* box or *paper* envelope (NB NOT plastic which rots the sample) to Science and Advice for Scottish Agriculture (SASA). Their full contact details are given in Chapter 6 later. Remember to enclose a covering letter giving your name and address, explaining what the sample is, what problem you suspect and saying where the bees are kept. You will be sent a FREE EXPERT DIAGNOSIS. This is a valuable service, so use it sensibly. If they diagnose one of the notifiable conditions, they will take the necessary steps of notifying SGRPID which takes that responsibility away from you.

Infestation by *Varroa* is now endemic in virtually the whole of Scotland apart from some of the outlying islands and a few isolated regions in the north-west. Because it had become so widespread, it was in 2007 removed from the list of notifiable diseases by the Scottish Government.

3. The development of the colony can be assessed by noting how many combs are occupied by the brood nest as it spreads out from its winter centre. I sometimes liken its development to the spread of a fire through the kindling and fuel laid out in a grate. Once it occupies all but the two outside combs on each side, the time has come, if the weather is fair, to put on the first honey super over a queen excluder. Do this too early rather than too late, or your hive may swarm before the end of May. Always ensure throughout the summer that you give ample room for the storage of honey.
4. A *full* brood comb of honey holds about 2.5 kg (5 lb). A *full* shallow comb holds about 1.5 kg (3 lb). Total colony reserves should never be allowed to fall below 5 kg (10 lb), and if they are falling to near this level, the beekeeper must be prepared to feed if the weather turns cold or wet, especially if this happens in the middle of summer when colonies are large and active and can soon use up a small reserve.

On the other hand if excessive reserve slabs of sealed honey or sugar syrup in the brood combs are restricting the queen's laying space, an excellent way of stimulating rapid development is to break with the hive tool the cappings over these slabs in two combs adjacent to the brood nest. The bees will then clean out these cells and prepare them for the queen, re-storing the honey elsewhere, provided you have given them room to do so, which you should have done. The extra feeding also stimulates the workers to greater activity.

After completing your spring inspection and closing up the hive, examine the old floor if it is

a solid one. Quite a lot can be learned from the dead bees on it, and any sign of other creatures or of damp patches. An open mesh floor is less informative but will still yield some information.

Then clean the old hive floor thoroughly by scraping it with the hive tool or brushing the mesh with a wire brush, and if possible scorching it with a blow-lamp to disinfect it. Put the scrapings into the rubbish bucket to be destroyed preferably by burning, especially any chalkbrood mummies to avoid spreading the infection around. It can then be used to replace the hive floor from the next hive that will be inspected.

Finally write up what you have found and add it to your running *hive record* being sure to state the answers to the four key questions listed at the start.

### 4.2.1 A disease inspection

Now that the two Foulbrood diseases are continuing to be found every year in Scotland, the Bee Inspectors are encouraging all beekeepers to make *one* disease inspection of every stock every season. This is best done before mid-May while hives are not too populous. The point about this inspection is that it concentrates on just ONE objective, namely to seek out any serious disease problem and to be prepared to take the appropriate action if a problem is found.

All brood combs are inspected and the routine for each brood box is as follows:-

- Ensure you have a supply of match-sticks or something like that for examining suspect sealed brood cells;
- Remove an end frame or dummy as usual to make working space. Leave the inspection of that frame till the end if it is not a dummy, but as usual ensure the queen is not on it when you prop it up outside the hive. If you find her, run her back into the hive.
- Then for each frame in turn, lift it and
  1. examine the adult bees on the frame for any signs of disease (paralysis or deformed wings);
  2. check the queen is not on the frame — if you find her run her back into the hive, preferably on to a frame already inspected;
  3. lower the frame into the centre of the working space in the box, and by bumping your hands down on to the edges of the box, bump most of the bees off the frame on to the floor of the hive;
  4. withdraw the frame again and make a very careful inspection of the brood cells, checking for a regular pattern of egg-laying, healthy worker brood in all stages, and not too much drone brood;
  5. look for signs of the two Foulbrood diseases (see Chapter 6), using a matchstick to investigate any suspect sealed brood cells, the used match-stick being then dropped into the smoker to burn;
  6. look for fouling of the comb by dysentery which might indicate *Nosema* disease.
- Write up all you have found, and decide what action is appropriate. If the hive has a clean bill of health note that fact along with the date in your hive record.

Beginners are strongly advised to have an experienced mentor to guide them as to what they find, and what is the appropriate action. Details of what to look for are given in Chapter 6 and that and other relevant literature on bee diseases should be carefully read before carrying out this inspection.

## 4.3 A swarm control system

More has been written in modern beekeeping books about the control of swarming than about any other topic. Swarming is a natural part of the bees' reproductive process and is therefore an impulse that is very hard to suppress altogether. However modern hives make it very easy for the beekeeper to increase the number of stocks in summer as and when it is desired to do so, and the bees' inclination to do so naturally, at a time of their choosing, to a place not usually in the beekeeper's apiary is now reasonably regarded by beekeepers as a nuisance which unnecessarily divides and diminishes their honey-gathering stocks. Add to this that a swarm which absconds and sets up home in the disused chimney of a house — a very common destination of a swarm left to its own devices — very often becomes a severe nuisance to the householder, as the worker bees usually find their way behind the plasterwork of rooms in the house and emerge into the rooms where they cause alarm and confusion, and you will understand that a beekeeper who allows swarms to fly at will these days is not the most popular person.

### 4.3.1 Finding, clipping and marking the queen

In order to implement a satisfactory swarm control system, it is often important to be able to find the queen in the stock that is preparing to swarm. This is made much easier if the queen is marked, since it is usually fairly easy to spot the single bee in a stock which has a conspicuous dot of paint on its thorax, whereas finding an unmarked queen in a populous stock is often very hard even for an experienced beekeeper. Also if one of the queen's wings is clipped, she will be unable to fly away with a swarm, and should you miss the opportunity to check swarm preparations in good time, the most likely outcome is that the queen will get lost in the grass near the hive when the swarm tries to leave. The swarm will then return home, and you will have a few days' extra grace to bring things under control, before the swarm flies off successfully with a newly emerged virgin queen.

My own current practice is to mark, but not clip my queens and I would recommend this for a beginner.

In April or early May most stocks of bees have not got large worker populations, and at that time of year queens are usually easily found, and then is the opportunity to find, clip and mark them.

Before starting to look for the queen, make sure you have all necessary equipment at hand. For marking, I use a "crown of thorns" queen marking cage which is a circular frame, about 5 cm in diameter, covered with a mesh of cotton threads too closely spaced for bees to squeeze through, and with a circle of steel spikes round the edge on one side, at queen excluder spacing, so workers can escape between them, but a queen cannot. Also you need to have a marking pen or marking paint at hand, opened up and ready for use. You may wish to use the appropriate year colour for the age of the queen — blue, white, yellow, red or green according as the year of the queen's birth ends with 0 or 5, 1 or 6, 2 or 7, 3 or 8, 4 or 9, the pattern repeating every 5 years. I currently use the marking pens supplied by the appliance dealers.

For clipping the queen (if you choose to do this) you need a good quality pair of small scissors with pointed blades, kept very sharp.

To find the queen, go systematically through the brood combs, and remember that she may be anywhere, though the most likely combs are ones in the centre of the brood nest where recently laid eggs are present. Scan each face of the comb generally first, and then systematically scan the face from the centre out in a spiral pattern. Do not work too slowly, or the queen may start to panic because of the long opening of the hive, and then she is likely to run away into an odd corner where you will fail to find her.

Once you have spotted her, pick up the queen marking cage without taking your eyes off the queen — did you lay it in a place from which you can pick it up without looking? — and gently place it over the queen, inserting the spikes into the wax of the comb without injuring the queen. Then press it down gently until the queen is lightly trapped. At this point you may move away from the hive. Take all necessary equipment with you.



If you are going to clip the queen it is best to do this first. To clip the queen, lift the cage a little till the queen can again move around, then press down slightly on the side where the queen's head is. She will back away, and with luck one of her pairs of wings will emerge between the threads on the cage. In this position, you can safely clip off about one third of the outer end of that pair of wings, without damaging her legs.

Incidentally, NEVER clip a virgin queen, since she must go out on her mating flight before she starts to lay, otherwise she will never be any use.

To mark the queen, press the cage down gently till the queen is trapped lightly but so that she cannot move, and then put one clear dot of colour in the centre of the back of the queen's thorax. Then wait a minute or so for the paint to dry, and then return to the hive.

To release the queen, hold the frame over the hive, so that if the queen falls off she will fall into the hive. Gently lift the cage to release the queen, and replace the comb in the hive, taking care the queen goes safely in.

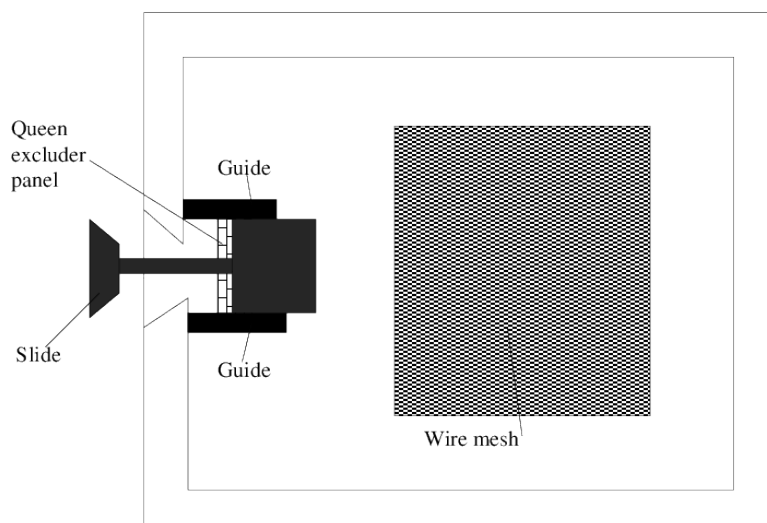
### 4.3.2 Using a Horsley Board

The system I shall describe here uses a special board called a Horsley Board. There are many other systems and they are well worth studying. None of them gives a 100% guarantee of avoiding all swarms. You may well have to deal at some time with a swarm from one of your own hives, as well as strays you may find or be called to deal with by others.

Almost all satisfactory systems of swarm control are based upon the same principle, namely that if the queen and her retinue of attendant workers can be physically separated from the bulk of the brood nest, and in particular from the stimulus of developing queen cells, then they will begin a new brood nest and will as an *artificial swarm* move on to the post-swarming phase of the colony's life-cycle.

The Horsley Board system requires the use of a second reserve brood box for each hive to be treated, equipped either with frames with foundation or preferably with drawn combs. I find it prudent, when possible, to keep a second such box on each hive throughout the year. In winter the bees have full access to both brood boxes. In summer I keep the reserve brood box above the queen excluder as a larger honey super until it is needed.

Also each such hive requires a Horsley Board, which consists of a board of the same size as a crown board, but with a large hole near the centre covered in wire mesh, and a smaller rectangular hole near one edge covered with queen excluder on the under-side. Next to this is an opening in the raised edge of the wooden board, into which a wedge can be inserted or withdrawn. When the wedge is withdrawn fully, a small piece of board covers the queen excluder. When the wedge is fully inserted, the queen excluder covered hole is open. See the diagram below.



In May most colonies will build a number of queen cups throughout the brood nest. If a hive becomes over-crowded, or if a queen is getting old, swarming preparations are more likely to arise, so giving the bees plenty of room, and ensuring as far as possible that stocks are headed by young vigorous queens are useful steps to take to try to prevent the need to control swarming, but most colonies will sooner or later prepare to swarm.

The first step in swarm control is to detect the time when the bees start to rear queens in some of the queen cups. This involves inspecting the brood nest at intervals of no more than nine days, so that there is no time for a queen cell to be sealed without the beekeeper's knowledge. Inspections should start in mid-May and continue until at least mid-July. The object is to detect whether there is a queen cup which *contains an egg or a larva*.

As soon as an occupied queen cell is found at an inspection, the swarm-control system must be put into operation, although as a temporary holding measure ALL queen cells and cups within the brood chambers may be destroyed *provided eggs are present in the brood combs* — destroying queen cells in a colony where there are no eggs to be seen is an easy way to end up with a hopelessly queenless colony. However if queen cells and cups are destroyed the colony must be dealt with again within five days, since the worker bees may choose to treat this situation as an emergency and convert some of the developing worker larvae into queens.

The swarm-control procedure proper consists of the following steps. You will need an extra solid stand on which to place the old brood box from the hive you are dealing with, a reserve brood box with full complement of either drawn comb or frames and foundation, and a small nucleus box or other empty deep box as a temporary holding place for the queen from the hive.

- Remove the honey supers.
- Go through the brood nest, remove any *sealed* queen cells, and in the same process *find the queen*. Remove *all* remaining queen cells on the frame with the queen on, and place that frame (with the queen) in the empty nucleus box which should then be covered over. Then finish removing sealed queen cells from the brood nest.
- Remove the brood box with the remaining brood nest to the side stand.
- Put the reserve box of foundation or drawn comb in place of the one that you have removed, remove two centre frames from it, and place into the gap the frame from the nucleus box *with the queen on it* — check she is still there. Then close the gap up and put one removed frame back at the edge of the new box.

- Close up the gap in the old brood nest, and place the other frame withdrawn from the new box into the space at the edge to fill the space.
- Reassemble the hive by:–
  - putting the queen excluder on top of the new box with the queen now in it;
  - putting the honey supers on top of the queen excluder;
  - putting the Horsley Board on top of the honey supers — trap door at back and on top, and entrance *closed*;
  - putting the box with the brood nest from the side stand on top of the Horsley Board;
  - finally replacing the crown board and the roof.

Note that if you fail to find the queen in the operation above, you should proceed as follows.

- Remove the brood box with the brood nest and queen to a side stand.
- Put the reserve box of foundation or drawn comb in place of the box you have removed.
- Place a completely empty super (no frames) on top of the reserve box.
- Working systematically one comb at a time and using smoke as necessary, shake and brush all the bees, including the queen from the old brood box down into the new one.
- Remove the empty super shaking down all bees in it.
- Cover the new brood box with the Queen Excluder.
- Place the supers above that.
- Place the Horsley Board above that on top of the honey supers — trap door at the back and closed.
- Place the old brood box on top of the stack, and carefully remove all *sealed* queen cells.
- Finally replace the crown board and the roof.

After you have removed covered the old brood box with the crown board, the nurse bees will find their way up to the brood nest through the queen excluder and queen excluder panel.

Whichever way you do it, you will be left with only flying bees and the queen in the bottom box, and all the nurse bees at the top along with the old brood nest and developing queen cells.

That concludes the first part of the operation.

The second part is very simple and should be carried out 3 or 4 days after the main operation. Just pull out the wedge on the Horsley Board to its full extent. This means that any flying bees then in the top box are forced to leave it by the Horsley Board slot and will then, because they know the usual entrance, join the box below, so that no flying bees at all will be left in the top box, which therefore will not swarm. Instead after another week, the emerging queens there will sort out their differences, and one will ultimately mate and start laying there, separated from the rest of the hive.

The old queen will establish a new brood nest down below, and should not swarm again.

Once the new queen is mated and laying, either the top box can be used to establish a new hive, or the old queen can be destroyed, and then the whole hive be re-united again with a new young queen.

When you have more experience, you can if you wish experiment further with the top box, splitting it up into several nuclei each with at least one queen cell. These, if successful, can be used to start several new colonies for yourself, or sold to other beekeepers who need bees.

## 4.4 Taking a swarm

When you find a swarm — your own or somebody else's — it is one of the most delightful parts of beekeeping to deal with it, if it is in an easy place. This is particularly so if it is in a stranger's garden who doesn't know about bees. All sorts of passers-by are willing to stop and watch from a distance while you work what looks like big magic, when in fact with a placid newly-emerged swarm it is child's play.

In a hard place — up a high tree, in a chimney, under the eaves of a roof — it is less fun; and you may break your leg or your neck, although the bees still won't hurt you.

However if the swarm has been out for a few days and is stale, they will have used up their reserves of honey and be far less amiable. Then be sure your veil is secure.

A swarm can only be taken when it has clustered. Ideally it will do so as my first one did from a few slender twigs low in a privet hedge, hanging there like a bunch of exotic fruit, with a few bees buzzing around it.

Necessary equipment:—

- veil and protective clothing;
- smoker, fuel and matches;
- a cardboard or other open box at least 30 cm (1 ft) cube;
- a dustsheet;
- secateurs;
- a small stone;
- a piece of string;

**Method:** Put on protective clothing. Light the smoker. Approach the swarm quietly with *no* smoke. Place the dustsheet on the ground below the swarm cluster. Place the box on the dustsheet. Gently grasp the twigs above the swarm cluster and support its weight — up to 3 kg (6 lb) of bees, so quite heavy. Cut the twigs with the secateurs *above* your supporting hand. Lower the swarm gently into the box. *Slowly* and *gently* invert the box on the sheet and prop up one corner with the small stone, so that there is a gap for bees to fly in and out. Most of the bees will cling to the inside of the box and cluster there.

By now quite a few bees will have taken wing. Smoke their old clustering place *heavily* and use smoke to break up any clusters forming away from the box. **KEEP SMOKE AWAY FROM THE BOX.** Provided the queen is in the box — which she almost certainly is — the bees in and around the box will start to fan out scent from the box at the propped up corner with their tails up exposing the scent-giving *Nasonov organ* at the tips of their abdomens. As they do so more and more of the flying bees will re-join the main cluster in and around the box and gradually enter the box to join the rest of the swarm.

Wait till you are satisfied that you have 90% or more of the swarm in the box, gently remove the stone, fold the sheet up over the box, tie it securely with the string, and put your prize in a cool sheltered spot until evening, making sure they have adequate ventilation.

If the cluster is in a slightly harder place like a wall or a large tree branch, then as much of it as possible must be *knocked* or lifted by handfuls and *thrown* firmly into the box, which is then inverted as before. If you find the queen, cage her in an empty matchbox, just open a crack, and place her in the cardboard box beside the bees. The rest of the swarm will then join her.

Having got as much as possible of the swarm into the box, proceed as before. The bees will *always* return to the queen, so you *must* get her in. Until the cluster in the box is well-established with

the queen there too, the swarm will keep trying to re-cluster where it first was, because the queen's scent clings there, and even after the main body are settling down in the box, clusters will keep trying to re-form on the old place, and there is always the danger that they may entice the queen back to join them. If it is feasible to give that place a dab of old car engine oil, it quickly cures that problem.

## 4.5 Hiving a swarm

In the evening the swarm must be hived, which is another fascinating operation. Prepare an empty hive (have you got a spare one?) on what is to be its permanent stand, with a floor, brood box fitted with sheets of foundation, a feeder, a crownboard and a roof. Put thin sugar syrup into the feeder before you hive the swarm.

Sloping *up* into the entrance with *no gap* lay a board of plywood or hardboard or other convenient material (hiving board), about 45 cm by 60 cm (18 in by 2 feet), and lay a white sheet over it.

As the sun is setting bring the swarm to the hive, carrying it gently in its wrapped up box. Put on your veil and protective clothing, open the box and bump the swarm out firmly on to the hiving board, making sure that you have knocked all the bees out of the box. They will not fly much at that time of day, which is the reason for waiting till evening, but will spread out like liquid on the board. Gradually a few leading bees will start to run up the board and when they find the hive with its inviting smell of beeswax, will start to fan scent to call the others. Like an orderly army on the march the swarm will walk in and take possession. It may take two hours for all to enter. If you watch carefully you may see the queen go in. Once you see them beginning to march in in a body you may leave them. Next day remove the hiving board.

A newly hived swarm should be fed generously with sugar syrup. They will repay you by drawing out beautiful straight combs of worker cells on the frames of foundation you have given them.

After a day or two, look in quietly and remove any frames the swarm is not covering. Put a dummy at one end of the remaining block of combs and move the block gently over to the opposite side of the hive. Fill the resulting empty space with loosely folded rags or crumpled newspaper to prevent the swarm from clustering there and drawing wild unframed comb hanging directly from the crownboard. Swarms love empty spaces so this is a very necessary precaution. The frames removed can later be replaced one at a time as the new colony develops and needs the space.

An inspection after a week or two should show a healthily developing brood nest. Remember however that not a single new worker can emerge from it until three weeks have passed, and that until then the swarm will dwindle through natural losses.

## 4.6 Dealing with a swarmed stock

If the swarm came from one of your own hives, then you must at all costs prevent the issuing of *casts*. Sometimes a swarm may have gone without your knowledge. If an inspection shows a depleted hive and several queen cells, some sealed, you will know that they have gone beyond recall, and that your hive is for the meantime queenless. While it remains queenless it will be short-tempered. There are two possible courses of action.

The first is to write off the hive as a production unit of honey for the season, but to treat it as a potential source of young queens. It may be possible to make up from its brood frames 3 or 4 viable nuclei, with one queen cell each. This should only be done if the hive had proved itself earlier as having a strain of productive and gentle bees. If this course is taken, the honey supers can perhaps be given to other hives to finish, after shaking off most of the bees into the nuclei.

The second course is to see that at least the hive re-queens itself as fast as possible, and builds up again for the later part of the season. Note however that a new queen hatching in a well-populated stock takes a very long time to get mated. The natural order of things after a hive has finished swarming

without interference, is for a new queen to emerge into a depleted hive, and in these circumstance it is found that she is much quicker to go out on her mating flight and to start laying.

To achieve the re-queening of a full stock after it has swarmed, the brood combs should be inspected until a well-formed but preferably *unsealed* queen cell, well placed in the middle of a comb is found. The bees should then be gently *brushed* from this comb, and any other queen cells on it destroyed. The top bar of this frame should then be marked with a drawing-pin and the comb gently and carefully replaced in the hive. That queen cell is your precious new queen and must be handled with care.

Next the bees should be bumped off every other brood frame in turn into the hive and *all* other queen cells destroyed. Don't miss any.

*N.B. Always locate and mark the queen cell you are going to KEEP before any queen cells at all are DESTROYED.*

If in going through the hive you come across a newly emerged virgin queen, or, as quite often happens, one issues from a cell when you break the top with your hive tool, ALL other queen cells should be destroyed. It actually doesn't matter if more than one virgin gets loose, since without a sealed cell to leave behind, the hive will not swarm. Instead the workers will let the virgin queens settle their differences in the usual way.

If there is still open brood in the hive at this stage, further inspections three days and six days later are needed to make sure the bees have not constructed new emergency queen cells on some of the young larvae. If they have, these must also be destroyed.

The stock should now be left for ten days or so, and then the marked queen cell sought out to make sure that the new queen has emerged as shown by a neat round hole at its lower end. The stock must now be left for the new queen to mate and begin laying.

As stated above a virgin queen in a small nucleus usually mates and begins laying much sooner than one in a large prosperous colony. Initially the swarmed stock will in fact recover strength quite quickly as the old queen's remaining brood matures and emerges. However after three weeks this is followed by a steady decline, since the gap in egg-laying after the swarm's departure means that there is then a corresponding gap in the emergence of young workers. If you have available a young mated queen in a nucleus to re-queen the swarmed stock immediately, this will avoid the long decline caused by a long gap in egg-laying. Note however that if you are going to re-queen with a young mated queen, you should destroy all queen cells, wait five days and destroy any further late queen cells, then wait another five days and check again for queen cells, at which point you may unite the stock with the nucleus (see later on uniting stocks). If you unite them earlier, the old stock may still have the swarming fever and fly off with your lovely new queen.

A swarmed stock that has re-queened itself or has been re-queened will not usually swarm again that season, but needs to be nursed back to strength.

## 4.7 Hiving a swarm on the site it came from

If the swarm that emerged was caught, a slightly different plan often works well.

In the evening remove the hive that has swarmed to a new site, and on the old site place a new brood box with empty combs or frames of foundation, but one frame of sealed brood from the swarmed stock after destroying any queen cells on it. Hive the swarm in this new hive on the old site, and then top it up next day with a queen excluder and the supers from the old hive. Usually the swarm will settle down and do well, as they will be joined by all the foraging workers from the old hive who of course make their way home to the old site. The old brood box on its new site should be treated as a swarmed stock in the usual way, and when its new queen is laying, the old queen can be destroyed and the two stocks re-united (see on *uniting* later on). With luck this will become a really powerful stock for late sources such as heather.